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Raytheon Aircraft

General

Beech
Hawker

July 30, 1999

In Reply Refer To: 940-99-07-3 16

Department of Transportation Dockets
Docket No. FAA-1999-5401 - 2 3
400 Seventh St. SW, Room Plaza 401
Washington, DC 20590

Subject: Aging Airplane Safety, Notice 99-02

Dear Sir or Madam:

Raytheon Aircraft Company (RAC) wishes to comment on Docket Number FAA- 1999-5401, Notice Number 99-02 "Aging Airplane Safety". This NPRM "proposes to require all airplanes operated under part 12 1 of Title 14, Code of Federal Regulations (14 CFR), all U.S.-registered multiengine airplanes operated under 14 CFR part 129, and all multiengine airplanes used in scheduled operations under 14 CFR part 135 to undergo records reviews and inspections by the Administrator after their 14th year in service to ensure that the maintenance of these airplanes' age-sensitive parts and components has been adequate and timely. It also proposes to permit certain representatives of the Administrator to conduct these inspections. The proposed rule also would prohibit operation of these airplanes after specified deadlines unless damage-tolerance-based inspections and procedures are included in their maintenance or inspection program ."

RAC agrees that in general terms this NPRM would help ensure the continuing airworthiness of some aging airplanes operating in air transportation by applying modern damage-tolerance analysis and inspection techniques to older airplane structures that were certificated before such techniques were available. However, the FAA only partially takes into account the manufacturer's on-going efforts to establish reliable inspection programs based on comprehensive fatigue analysis, fatigue tests and field service data.

The following are RAC's comments. Text of the NPRM is shown in Italics.

SPECIFIC COMMENTS ON THE NPRM

Page 16301 first full paragraph:

> *The FAA estimates that 1,550 airplanes affected by this proposed rule would exceed 24 years in service by 1998. The estimated number of airplanes that will be 15 years old by I998 is 2,850. Therefore, the proposed rule provides for approximately I, 500 airplanes to be inspected within the first 3 years following the effective date of the rule, followed by an approximately equal amount to be inspected in the subsequent 2 years.*

To properly validate the impact of this NPRM, FAA should update the estimate of the number of airplanes affected to current year or implementation year. Due to the delay in publishing of this NPRM and subsequent delay of implementation of a final rule, real time estimates would be more valid.

Page 16301 "Records Review" second paragraph:

> *This proposal would establish a new requirement for "total years in service". The FAA has determined that this new requirement is essential for the Administrator and the operator to determine the compliance time for the initial and repetitive inspections. To meet this requirement, the operator would retain records validating when the initial certificate of airworthiness was issued for each airplane.*

It is not always possible to determine when the initial certificate of airworthiness was issued, especially on older aircraft. FAA should consider publishing guidelines for determining "total years in service" when the determination is not possible.

Page 16301 "Records Review" third paragraph:

> *In addition, the FAA is aware that an airframe's flight cycles are not currently being collected by operators of small airplanes under part 13.5. This proposal would require that the operator make certain records and reports available to the FM during the proposed aging airplane records review inspection.*

FAA should publish guidelines for establishing a baseline for number of cycles if an operator has not been maintaining records on that information (part 135 operations).

Page 16301, third column, third full paragraph:

> *Damage-tolerance-based inspections and procedures for airplanes certificated before the amendments that require damage tolerance as part of airplane type design may be approved through an amended or supplemental type certificate. Such a certificate would identify the damage-tolerance-based inspections andprocedures as an airworthiness limitation on the airplane.*

Is it FAA's intent to require manufacturers to submit applications (FAA Form 811 O-12) for type certificate amendment? FAA states that "Such a *certificate* would identify the damage-tolerance-based inspections and procedures as an airworthiness limitation on the airplane." If it is FAA's intent to require application, then the ACO offices may be overwhelmed, especially as the deadline approached. If it is indeed the intent, then this is a workload consideration that was not accounted for in FAA's cost-benefit analysis for this NPRM.

Is it FAA's intent to modify the TCDS as a result of incremental changes to type design (as the definition of an amended type certificate) or by supplemental type certificate? RAC routinely adds inspection requirements for life limited components in the Airworthiness Limitations Sections of the Maintenance Manual as part of incremental changes to type design. In either case, FAA should clarify the procedures for obtaining FAA approval.

Page 16301, third column, fourth full paragraph:

> *Damage-tolerance-based inspections and procedures for certain older airplanes also may be approved by a Letter of Approval issued by the FAA Aircraft Certification Office cognizant of the type certificate. The Letter of Approval wouldplace an operational requirement for the operator's affected airplanes.*

Is this paragraph intended to reflect damage-tolerance-based inspections and procedures prepared by someone other than the manufacturer? If so, it should be clarified. "The Letter of Approval would place an operational requirement for the operator's affected airplanes." Define what is intended by "operational requirement". Would this letter be placed in the Airworthiness Limitations Section of the Mainte-

nance Manual, in the AFM(s), in the log book(s), or in front of the procedures manual? FAA should clarify to standardize.

Page 16302 first paragraph:

> *The FAA is aware that for some currently operating airplanes it may be difficult to develop damage-tolerance-based inspections andprocedures. For example, the manufacturer may have gone out of business; technical data may not be adequate; the technical knowledge base may no longer be readily available; or the development of a damage-tolerance-based inspections and procedures may not be economically viable.* ***If*** *any of these conditions exist and appropriate damage-tolerance-based inspections andprocedures cannot be developed those airplanes would not be eligible for operation under part 121, 129, or I35 after the dates specified in the proposal.*

If the manufacturer establishes life limits based on fatigue analysis or testing, and has service experience substantiating the continued safe operation of an aircraft, it is unconscionable for FAA to issue a rule that will prohibit these airplane's from operating at an arbitrary date. An airplane will be no less safe on December 19, 2010, than it will be on December 20, 2010. Even though the FAA argues that an airplane can continue to operate under 135 on demand taxi operations, as a 135 cargo operator or under part 91, the utility of the airplane for its owner will be lost. FAA has stated that they are considering similar rules for the remaining 135 operators (page 16300, third paragraph). Supplemental rulemaking could be financially devastating to the remaining fleet of airplanes already forced into limited flight operations.

RAC has never had a failure of any part (which had a fatigue analysis or had undergone fatigue testing) before the established life limit. Based on RAC's service history, RAC is confident that the life limits established for Raytheon (Beech, Hawker) airplanes are adequate to assure continued safe operation. Other manufacturers are also able to provide similar statements regarding their service history based on fatigue analysis and fatigue testing. These airplanes should not be forced into early retirement based on an arbitrary deadline.

FAA clearly agrees that the limits established by a number of manufacturer's for certain models "are considered adequate to ensure the safety of these airplanes until they reach the listed design-life goal" (page 16302 top of third column continuation paragraph). FAA also states (page 16302, third column, last paragraph), that "The FAA has reviewed the assessments that resulted in the life limit requirements described below, and has determined that those requirements appropriately, if not conservatively, reflect the times in the aircraft's service lives when significant maintenance must be performed on the critical structures to maintain the level of safety required for air transportation." Why then must an arbitrary limit be set which in most cases, if not all cases, precedes the design life goal?

If an operator had chosen to comply with the "Commuter Rule" (page 16304, third column, first paragraph) to maintain the utility of his airplane, and had already made some upgrades to continue operating under FAR 12 l after December 20, 2010, his investment in the upgrades will be lost. Or, the operator will be forced to establish damage-tolerance based inspections and procedures to protect his investment. Compliance with NPRM 99-2 for these operators will create an undue burden that was not forecast with the implementation of the commuter rule.

Page 16302, second column second paragraph from the bottom:

> *However, for airplane models initially certificated to carry nine or fewer passengers listed in the proposed appendixes to part 129 and part 135, the proposal requires damage-tolerance-based inspections andprocedures sooner than December 20, 2010.*

The text should be revised correspond to the rule 129.16(b) and 135.168(b) as follows:

However, for airplane models initially certificated to carry nine or fewer passengers listed in the proposed appendixes to part 129 and part 13.5, the proposal **does not** *requires damage-tolerance-based inspections and procedures sooner than December 20, 2010.*

Page 16303, Beech 99 (All Models):

RAC would like to add the following comments.

There is currently a Continued Airworthiness Program in place for these aircraft which is based on full scale test and field experience. This program details inspections of all major components - wing, fuselage and empennage. The 46,000 hours life limit currently published is based on analysis supported by test data.

Page 16303, Beech 1900 (All Models):

The wing on these aircraft use a damage tolerance approach based on test data to define an inspection program. The fuselage uses a fail-safe approach based on test data to define an inspection program. The empennage is currently a safe life item based only on analysis.

Page 16303, Beech 300, 300LW, B300 and B300C:

The wing on these aircraft use a damage tolerance approach based on test data to define an inspection program. The fuselage uses a fail-safe approach based on test data to define an inspection program. The empennage is currently a safe life item based only on analysis.

Page 16304, Related Activity, second column, paragraph 2:

The proposal would require a repair assessment for the pressurized fuselages of Airbus A300, Boeing 707/720, 727, 737, and 747; Douglas DC-8, DC-9/MD-80, and DC-l 0; British Aerospace BAC l-l 1; Fokker F-28; and Lockheed Ll O-l 1 airplanes. The recommendation currently is being reviewed within the FAA, and publication of an NPRM is anticipated in the near future.

This NPRM was issued January 2, 1998 in the Federal Register, Docket 29104, Notice 97-16.

Page 16304, Related Activity, second column, paragraph 3:

In addition, the FAA has found that some operators do not have a programmatic approach in place to appropriately address airplane corrosion. A rulemaking effort is being considered that would require development and implementation of a corrosion prevention and control program for all airplanes used in air transportation. The FAA anticipates publication of rulemaking on this subject in 1998.

As of today, RAC has not seen the NPRM proposed for 1998. Please provide a current status.

Page 16305, Section 121.370a, paragraph 2:

Proposed paragraph (b) would permit operators of airplanes listed in appendix M to part 121 to operate these airplanes without non-damage-tolerance-based inspections andprocedures in their maintenance programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the rule, whichever occurs later. However, no aircraft may operate without damage-tolerance-based inspections and procedures after December 20, 2010.

If FAA's intent of this NPRM is to prohibit operation without damage-tolerance-based inspections and procedures in place after 2010, regardless of service history or inspections based on fatigue analysis of fatigue testing, the last phrase should read:

> *Proposedparagraph (b) wouldpermit operators of airplanes listed in appendix* **N** *to part 121 to operate these airplanes without non-damage-tolerance-based inspections andprocedures in their maintenance programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the rule, whichever occurs* **sooner.** *However, no aircraft may operate without damage-tolerance-based inspections and procedures after December 20, 2010.*

Additionally, as shown above, the correct reference to the Appendix is "N" not **"M".**

Page 16305, Section 129.16, paragraph 4:

> *Proposed paragraph (c) would permit foreign air carriers or foreign persons to operate U.S. - registered airplanes of the type listed in appendix B to part I29 without damage-tolerance-based inspections and procedures in their maintenance programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the proposed rule, whichever occurs later. However, no airplane may be operated without damage-tolerance-based inspections and procedures after December 20, 2010.*

If FAA's intent of this NPRM is to prohibit operation without damage-tolerance-based inspections and procedures in place after 2010, regardless of service history or inspections based on fatigue analysis of fatigue testing, the last phrase should read:

> *Proposed paragraph (c) would permit foreign air carriers or foreign persons to operate U.S. - registered airplanes of the type listed in appendix B to part 129 without damage-tolerance-based inspections and procedures in their maintenance programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the proposed rule, whichever occurs* **sooner.** *However, no airplane may be operated without damage-tolerance-based inspections and procedures after December 20, 2010.*

Page 16306, Section 135.168, paragraph 1:

> *Proposedparagraph (c) wouldpermit operators of airplanes listed in appendix F to part 135 to operate these airplanes in scheduled service without damage-tolerance-based inspections and procedures in their inspection programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the proposed rule, whichever occurs later. However, no airplane may be operated without damage-tolerance-based inspections andprocedures after December 20, 2010.*

If FAA's intent of this NPRM is to prohibit operation without damage-tolerance-based inspections and procedures in place after 2010, regardless of service history or inspections based on fatigue analysis of fatigue testing, the last phrase should read:

> *Proposed paragraph (c) wouldpermit operators of airplanes listed in appendix G to part 135 to operate these airplanes in scheduled service without damage-tolerance-based inspections and procedures in their inspection programs until reaching a design-life goal specified in the appendix, or 4 years after the effective date of the proposed rule, whichever occurs* **sooner.** *However, no airplane may be operated without damage-tolerance-based inspections and procedures after December 20, 2010.*

Additionally, as shown above, the correct reference to the Appendix is "G" not **"F".**

Page 16307, Development and Implementation Costs, column 3, paragraph 2:

> *Under the proposal, the affected airplanes (15 years or older) would be generally subject to a mandated inspection program within 4 years after the effective date of the rule (the year 2002.)*

The effective date of the rule plus four years is at least 2003.

Page 16308, Development and Implementation Costs, column 3, paragraph 1:

> *The numbers of inspections that could be expected throughout the study period (year 2018) were computed based on the factors: (I) the number of years between the year the program would be due and the year 2018, (2) the annual number of hours that each airplane would fly (ranging between 858 and 1154 hours per year[1], depending on airplane size), and (3) an assumed inspection interval of every 4,000 hours.*

Item (2) annual number of hours estimate (based on the footnote noted below) still does not properly account for a special segment of aircraft, the commuters, which annually fly an average of 2000 hours (twice FAA's estimate). The frequency of inspections for these aircraft would be increased compared to other types of aircraft. FAA considered two classes of airplanes, those with less than ten seats and those with more than ten seats. FAA should have also considered a third class, those with 10- 19 seats. Failure to consider this type of aircraft separately may lead to an improper cost evaluation.

Page 16309, Development and Implementation Costs, column 3, paragraph 1:

> *Failure to comply with the rule would not ground an airplane and eliminate its value, but instead, would preclude its being used in scheduled passenger service. The airplane could still be used for cargo or on-demand service under part 135.*

This statement is only valid if FAA doesn't follow through with the intent to issue similar rules for cargo or on demand service under part 135 (page 16300, third paragraph). If a similar rule is imposed, FAA's argument is flawed.

Page 16310, Description of Benefits, column 3, continuation paragraph (under tables):

> *All of the airplanes that would be required to eventually implement damage-tolerance based inspections and procedures under this proposal fall into one of the categories described above. And even where some fatigue related evaluation and assurance was made at the time the airplane was designed and built, those assurances were never intended to be valid after the airplane exceeded the maximum number of flight hours assumed by the designer. Left unchecked it is not a question of whether the repeated loadings on aircraft will produce a major structural failure, but rather, when. More than 29 percent of the airplanes under this proposal are already 20 years old or older; 14 percent are over 30 years old; and 7 percent of the airplanes are over 40 years old. Under existing procedures, the FAA cannot assure the continuing airworthiness of these airplanes, and that constitutes an unacceptable risk to air transportation.*

FAA must require the operators to follow the manufacturer's existing supplemental inspection procedures that are already in place and ensure operators replace parts at the design life limits. Once compliance is enforced, the continuing airworthiness of an aircraft can be assured.

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[1] The annual flight hours were based on a regresston of atrcraft by number of seats and flight hours from page IX-22 of the 1995 FAA Aviation Forecasts To avoid the appearances of excess precision and to account for the operating differences between transport category and small commuter airplanes, the results were aggregated mto two broad categories atrplanes with 9 seats or less, and airplanes with 10 seats or more The assumed mspectron interval of 4,000 hours was estimated by FAA field engineering staff, based on their projections of what would be found to be necessary when the supplemental mspectron programs are developed This number is an aggregated simplification since, especially for larger airplanes, it is expected that different areas of an airplane will have different mspectron Intervals

Page 16314, Rigor of requirements, column 2, end of paragraph 1:

> *Obviously, the non damage-tolerance based program would induce lower costs but with a concomitant reduction in safety assurance.*

This statement is incorrect for structural integrity inspection and procedures programs developed using comprehensive fatigue analyses, fatigue tests and the correlation of field service data.

Page 163 14, compliance assistance, paragraph 1:

> *In its efforts to assist small entities and other affectedparties in complying with the proposed rule, the FAA is publishing an advisory circular, "Continued Airworthiness of Older Small Transport and Commuter Airplanes; Establishment of Supplemental Inspection Programs." A notice of availability for this circular will be published concurrently with the proposed rule. This circular will detail acceptable means of compliance with the proposed rule.*

The Advisory Circulars published concurrently with this NPRM did not include one entitled "Continued Airworthiness of Older Small Transport and Commuter Airplanes; Establishment of Supplemental Inspection Programs." It included one "Continued Airworthiness of Older Small Transport and Commuter Airplanes: Establishment of Damage Tolerance-Based Inspections and Procedures". Is there an additional Advisory Circular to be published or did the title change?

If the title changed, it needs to be corrected in the final rule. If the document still is yet to be issued, FAA should consider withholding issuance of the final rule until adequate guidance material is available.

Page 16314, compliance assistance, paragraph 2:

> *In addition, the FM has undertaken a research program to develop a simplified damage-tolerance based methodology, directly applicable to commuter sized airplanes. The results of this work will be available in the public domain and could be used by small manufacturers or designated engineering representatives (DERs) to aid their development of the inspections needed to comply with the proposed rule. Again, however, the benefits of a simplified damage-tolerance based methodology for smaller airplanes would be realized by both small and large air carriers.*
>
> *The estimated cost to the government to develop the generic methodology is $4 million. To date, approximately $2.2 million has been spent and work is expected to be completed in fiscal year* 2000.

Again, if the document still is yet to be issued, FAA should consider withholding issuance of the final rule until adequate guidance material is available.

Page 16316, §121.370a :

> *(b) A certificate holder may operate an airplane listed in appendix M to this part as follows:*
>
> *(I) If the time in service of the airplane reaches the design-life goal listed in appendix M to this part before [4 years after the effective date of the rule] . . .*
>
> *(2) If the time in service of the airplane reaches the design-life goal listed in appendix A4 to this part on or after [4 years after the effective date of the rule] . . .*

The correct reference to the appendix is N, as shown below.

(b) A certificate holder may operate an airplane listed in appendix N to this part as follows.

(1) If the time in service of the airplane reaches the design-life goal listed in appendix N to this part before [4 years after the effective date of the rule] . . . .

(2) If the time in service of the airplane reaches the design-life goal listed in appendix N to this part on or after [4 years after the effective date of the rule] . . .

Page 16317 §129.33(d)(8)(iii):

(iii) Inspections and procedures required by $121.3 70a of this Chapter.

The reference should be 129.16.

Page 16318, §135.168:

(c) A certificate holder may operate an airplane listed in appendix F to this part as follows:

(1) If the time in service of the airplane reaches the design-life goal listed in appendix F to this part before [4 years after the effective date of the rule] . . .

(2) If the time in service of the airplane reaches the design-life goal listed in appendix F to this part on or after [4 years after the effective date of the rule] . . .

The correct reference to the appendix is G, as shown below.

(c) A certificate holder may operate an airplane listed in appendix G to this part as follows:

(I) If the time in service of the airplane reaches the design-life goal listed in appendix G to this part before [4 years after the effective date of the rule] . . .

(2) If the time in service of the airplane reaches the design-life goal listed in appendix G to this part on or after [4 years after the effective date of the rule] . . .

SUMMARY

FAA must consider that if an airplane will reach its design life goal as listed in the appropriate appendix (or safe life) after December 20, 20 10, it should be acceptable to operate the airplane until it reaches this design life goal which is based on fatigue analysis and tests, and supported by field experience. In addition, after the replacement of life limited components, it should be acceptable to continue operating the airplane using the safe life based program until the next safe life limiting value is reached and these components are replaced. FAA should allow the continued replacement of life limited components based on experience gained with the fleet airplanes and an appropriate inspection and maintenance program based on fatigue analyses, fatigue tests and field experience. Justification for this statement follows:

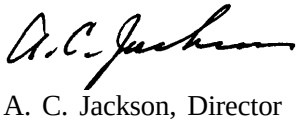
FAA policy in the early 1990's required termination of repetitive inspections for structural components susceptible to fatigue damage and the replacement of such components with improved components not requiring repetitive inspections. This policy was based on FAA's belief that inspections were not sufficiently reliable for determining the necessary level of structural integrity. Secondly, manufacturers will likely continue the construction of some airplane designs presently subject to the proposed NPRM, and will therefore need to place these new airplanes into service based on their highly effective non-damage tolerance structural integrity programs.

Thirdly, the FAA, by this proposed NPRM, will be mandating the inspection of airplanes in the fleet and requiring compliance with structural integrity inspection and maintenance programs. Finally, because of the absence of a FAA program to ascertain the actual structural integrity of airplanes presently in service, and whether these airplanes have been complying with structural integrity inspection and maintenance programs developed by the manufacturers, the FAA cannot justify the future rejection of non-damage tolerance based programs that were derived from well thought out and well executed fatigue analysis, fatigue tests, and service experience correlation.

If these manufacturers developed programs which were reviewed and accepted by not only the FAA but the TOGAA as well, had been previously made mandatory by the FAA, and if similar comprehensive programs had been required of the STC holders, it is possible that the "Aging Aircraft Safety Act of 1999" would not have been necessary.

FAA should allow the continued replacement of life limited components based on experience gained with the fleet airplanes and an appropriate inspection and maintenance program based on fatigue analyses, fatigue tests and field experience. In cases where this information is not available, use of damage tolerance based inspections and procedures would indeed help assure the continued airworthiness of aging airplanes operating in air transportation.

Sincerely yours,
RAYTHEON AIRCRAFT COMPANY



A. C. Jackson, Director
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ACJ:DMW